



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--------------------------------------|-------------|----------------------|---------------------|------------------|
| 10/807,949 | 03/24/2004 | Tong Zhang | 200300641 | 4075 |
| 22879 | 7590 | 10/29/2007 | EXAMINER | |
| HEWLETT PACKARD COMPANY | | | REDDING, THOMAS M | |
| P O BOX 272400, 3404 E. HARMONY ROAD | | | ART UNIT | PAPER NUMBER |
| INTELLECTUAL PROPERTY ADMINISTRATION | | | 2624 | |
| FORT COLLINS, CO 80527-2400 | | | | |
| | | MAIL DATE | | DELIVERY MODE |
| | | 10/29/2007 | | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | |
|------------------------------|-------------------|--------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/807,949 | ZHANG, TONG |
| | Examiner | Art Unit |
| | Thomas M. Redding | 2624 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-22 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 24 March 2004 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 4/17/2006.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____.
- 5) Notice of Informal Patent Application
- 6) Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-2, 4-5, 7-11, 14, 16, 18, 19 and 21 are rejected under 35 U.S.C. 102(a) as being anticipated by Li et al. (US 2003/0210886).

Regarding claims 1 and 14, Li discloses [a] key-frame extraction system (A number of keyframes are allocated among the shots based on the importance value of each shot, Li, paragraph 8), comprising:

a set of frame analyzers that each select a set of candidate key-frames from among a series of video frames in a video, each frame analyzers for detecting a meaningful content in the video ("Frame Importance Computation", Li paragraph 51); key-frame selector that arranges the candidate key-frames into a set of clusters ("After decomposing the video sequence 20 into scenes 22, shots 24 and frames 26,

Art Unit: 2624

each component scene 22, shot 24 and frame 26 is assigned an importance value based on measurements which are explained in greater detail below”, Li, paragraph 29, all frames are potential key frames, frames are clustered into scene, shot and frame groupings) and that selects one of the candidate key-frames from each cluster as a key-frame for the video in response to a relative importance of each candidate key-frame (“After frame importance has been determined, the number of keyframes NS_i assigned to each shot must be selected from all F frames in the shot”, Li, paragraph 65).

Regarding claims 2 and 19, Li discloses [t]he key-frame extraction system of claim 14, wherein the frame analyzers include a camera motion tracker (“Camera motion may be detected by analyzing the layout pattern of the extracted motion vectors mv”, Li, Paragraph 42 and figure 3).

Regarding claim 4, Li discloses wherein the step of selecting a set of candidate key-frames includes the step of selecting a set of candidate key-frames in response to a fast camera movement in the video (“The last two factors are used to make sure that the extracted keyframe is a well-focused clear image and not a blurry image, such as is caused by a fast camera motion, fast object movement or a bad camera focus. For example, the still image taken after a camera panning is preferred over the image taken during the panning which may be blurred or unstable”, Li paragraph 52, Li discloses that fast camera motion causes blurring and it is better to avoid those frames and to use frames outside a sequence of fast camera motion).

Regarding claims 5 and 21, Li discloses wherein the frame analyzers include a human face detector (“Four factors are considered in determining the importance of a frame 26 according to one embodiment of the invention: 1) ...; 2) the number of detected human faces in the frame ...”, Li, paragraph 52).

Regarding claim 7, Li discloses wherein the step of selecting one of the key-frames from each cluster includes the step of determining an importance score for each candidate key-frame (“an importance value is assigned to each scene, shot and frame”, Li, paragraph 8).

Regarding claim 8, Li discloses wherein the step of determining an importance score for each candidate key-frame includes the step of determining an importance score in response to the meaningful content in each candidate key-frame (“FIG. 1c is a flowchart illustrating one embodiment of the computation of importance values according to the invention”, Li, paragraph 11, and figure 1c)

Regarding claim 9, Li discloses wherein the step of selecting one of the key-frames from each cluster includes the step of selecting one of the key-frames in response to an image quality of each candidate key-frame (“The last two factors are used to make sure that the extracted keyframe is a well-focused clear image and not a blurry image”, Li, paragraph 52).

Regarding claim 10, Li discloses further comprising the step of selecting multiple key-frames from each cluster and obtaining a user selection for the multiple key-frames (“if the user wants a detailed summary of certain scenes 22 or shots 24 while only wanting a brief review of others, the invention as described herein can easily achieve this by using a predefined but tunable scale factor”, Li paragraph 73, the system selects an initial keyframe set and the user can control how many to select based on a tunable scaling factor).

Regarding claims 11 and 16, Li discloses wherein the analyses include an accumulative color histogram difference comparison of the video frames (“To quantify the activity level for a scene 22, the frame-to-frame color histogram difference for each consecutive frame pair within the scene is computed and their average is used as the scene's activity level indicator”, Li, Paragraph 34).

Regarding claim 18, Li discloses wherein the frame analyzers include a fast camera motion detector (“The last two factors are used to make sure that the extracted keyframe is a well-focused clear image and not a blurry image, such as is caused by a fast camera motion”, Li paragraph 52).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3, 6, 13, 15, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (US 2003/0210886) in combination with Chang et al (US 2004/0125877).

Regarding claims 3 and 20, Li discloses all the elements of claims 1 and 14 above. Li does not explicitly teach selecting a set of candidate key-frames in response to an object motion in the video.

Chang, working in the same field of endeavor of video analysis, does teach selecting a set of candidate key-frames in response to an object motion in the video ("a Visual Feature Extraction Module 340 extracts visual features that can be used for view recognition or event detection. Examples of visual features include camera motions, object motions, color, edge, etc.", Chang, paragraph 104).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to add the object motion detection feature of Chang to the video

Art Unit: 2624

analysis system of Li in order to aid in detecting scene changes, "Since there are many different changes in video (e.g. object motion, lighting change and camera motion), it is a nontrivial task to detect scene changes", (Chang, paragraph 77).

Regarding claims 6 and 15, Li does not disclose an audio event detector that selects a set of candidate key-frames by detecting a set of audio events in the video.

Chang, working in the same field of endeavor of video analysis, does teach an audio event detector that selects a set of candidate key-frames by detecting a set of audio events in the video ("An Audio Feature Extraction module 345 extracts audio features that are used in later stages such as event detection", Chang, paragraph 105).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to add the Audio Feature Extraction Module feature of Chang to the video analysis system of Li in order to aid in detecting scene changes that have characteristic sound events associated with them ("more detailed analysis of motion such as speed, direction, repeating patterns in combination with audio analysis (e.g., hitting sound) may be needed.", Chang, paragraph 185).

Regarding claims 13 and 22, Li does not disclose a user interface for displaying a set of video frames in the video previous to each key-frame and a set of video frames in

Art Unit: 2624

the video subsequent to each key-frame and for obtaining a user selection of one or more of the video frames.

Chang, working in the same field of endeavor of video analysis, does teach a user interface for displaying a set of video frames in the video previous to each key-frame and a set of video frames in the video subsequent to each key-frame and for obtaining a user selection of one or more of the video frames ("there may be false alarms or misses associated with the indexing process. A browsing interface may be used for users to identify and correct false alarms. For errors of missing correct scene changes, users may use the interactive interface during real-time playback of video to add scene changes to the results", Chang, paragraph 100).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to add an interactive interface as taught by Chang to the video analysis system of Li so "If a user is monitoring the scene change detection process and notices a miss or false detection, he or she can hit a key or click mouse to insert or remove a scene change in real time." (Chang, paragraph 99).

5. Claims 12 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (US 2003/0210886) in combination with Dufaux (US 6,711,587 B1).

Regarding claims 12 and 17, Li discloses all the elements of claims 1 and 14. Li does not teach wherein the frame analyzers include a color layout analyzer.

Dufaux, working in the same field of endeavor of keyframe selection does teach wherein the frame analyzers include a color layout analyzer ("Returning to FIG. 5, at step 502 a pixel-wise frame difference number is calculated for each frame. A measure of the amount of difference between pixels in successive frames may be used to determine a shot boundary in the digital video file", Dufaux, column 8, line 37, Dufaux's method computes color differences at specific x,y locations corresponding to a physical layout of the features).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to use the frame difference method of Dufaux with the video analysis system of Li to provide another method to test for shot boundaries since "A high value of pixel-wise frame difference indicates a possible shot boundary" (Dufaux, column 8, line 47).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas M. Redding whose telephone number is (571) 270-1579. The examiner can normally be reached on Mon - Fri 7:30 am - 5:00 pm EST.

Art Unit: 2624

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TMR/



VIKKRAM BALI
PRIMARY EXAMINER